



2014 STOCK STATUS UPDATE OF LOBSTER (*HOMARUS AMERICANUS*) IN THE BAY OF FUNDY (LOBSTER FISHING AREAS 35-38)

Context

The status of the lobster resource in the Bay of Fundy (Lobster Fishing Areas, LFAs, 35-38) to the end of the 2011-12 seasons was assessed in February 2013 (DFO 2013, Gaudette et al. 2014, Tremblay et al. 2013). Fisheries Management has requested "interim information on the status of LFAs 35-38 lobster stocks to maintain the scientific basis for management advice consistent with DFO's Precautionary Approach (PA)". The PA defined in the 2013 assessment identified three key indicators (landings, commercial catch rate and summer research survey catch rate) that capture changes in lobster abundance and proposed reference points for each indicator (Tremblay et al. 2013). This Science Response updates these indicators to the end of the 2012-13 fishing season. The results of this analysis indicate that the lobster stock in LFAs 35-38 was in the healthy zone at the end of the 2012-13 fishing year.

This Science Response Report results from the Science Response Process of 8 September, 2014, on the Lobster Fishing Areas (LFA) 35-38 Lobster Stock Status Update.

Background

Commercial lobster fishing in LFAs 35-38 takes place in the Bay of Fundy (Figure 1) and borders the two biggest lobster fisheries in the Northwest Atlantic: LFA 34, which has the highest landings (approximately 22,000 mt in 2012-2013; DFO 2014) and the most participants (979 licenses; Tremblay et al. 2013) of any LFA in Canada, and Maine, with annual landings recently surpassing 54,000 mt ([Historical Maine DMR Fisheries Landings Data](#)). Landings in LFAs 35-38 began a long-term increase in the mid-1990s, and current landings are at record highs. This increase in landings occurred in most of the Gulf of Maine regions as well as many other lobster stocks in Atlantic Canada.



Figure 1. Lobster Fishing Areas (LFA) 35-38 in the Bay of Fundy. LFA 37 is a shared fishing area between LFAs 36 and 38.

The fishery is managed by input controls, including a minimum legal size (MLS=82.5 mm carapace length, CL), prohibition on landing of both egg-bearing and V-notched females, limited entry, fishing seasons and trap limits. Fishing seasons and traps limits differ among LFAs (Table 1). Other management measures include the requirement of vents to allow sublegal sized lobster to escape, and biodegradable trap mechanisms to mitigate ghost fishing by lost traps.

Table 1. Fishing seasons, trap limits, and total number of licenses for each LFA within the Bay. Note that LFA 37 is a shared fishing area where fishermen from LFAs 36 and 38 are authorized by license condition to fish.

LFA		Fishing Seasons	Traps Limits	No. Licenses
35	Fall:	Oct. 14 – Dec. 31	300	95
	Spring:	Last day Feb. – July 31		
36	Fall:	2 nd Tuesday in Nov. – Dec. 31	300	177
	Spring:	March 31 – June 29		
38		2 nd Tuesday in Nov. – June 29	375	136

Analysis and Response

The assessment of LFAs 35-38 (DFO 2013, Gaudette et al. 2014, Tremblay et al. 2013) provided a full analysis of stock health by describing fishery performance and providing indicators for abundance, fishing pressure and reproduction. Spatial variation of these indicators was evaluated. With regard to the PA, three abundance indicators were regarded as primary and associated reference points were tabled. The first abundance indicator was based on landings. Landings-based reference points are part of the current Inshore Lobster Integrated Fishery Management Plan for LFAs 27-38. The basis for these was documented at a Maritimes Region Science Advisory Meeting in 2012 (DFO 2012). It was recognized that using landings as the sole indicator of abundance for lobster stocks has risks, and one of the goals of the 2013 assessment (DFO 2013) was to provide potential alternatives. Two additional abundance indicators and associated reference points were proposed. One was based on commercial catch rate calculated as total landings/total trap hauls in LFAs 35-38 from complete records of the fishermen logbooks. The second was based on the stratified mean of number of lobsters per tow in a fishery-independent trawl survey (summer Research Vessel [RV] Survey). The abundance indicators and proposed Upper Stock References (USR) are provided below.

Landings and Catch Rate

An upward trend in landings was recorded for the past 18 fishing years (1994-95 to 2012-13) in all three LFAs, and recent landings are the highest on record, surpassing 8,000 metric tons per fishing year since 2011-12 (Figure 2). The proposed USR for the abundance of legal lobsters based on landings is defined as 80% of the median for the period 1984-85 to 2008-09, which corresponds to 1,575 mt. The metric for assessing where the stock is relative to the proposed USR is the 3-year moving average of landings. For the fishing year 2012-13, the 3-year moving average was at 7,957 mt, 5 times the proposed USR. By this measure, the LFAs 35-38 lobster stock is considered in the healthy zone.

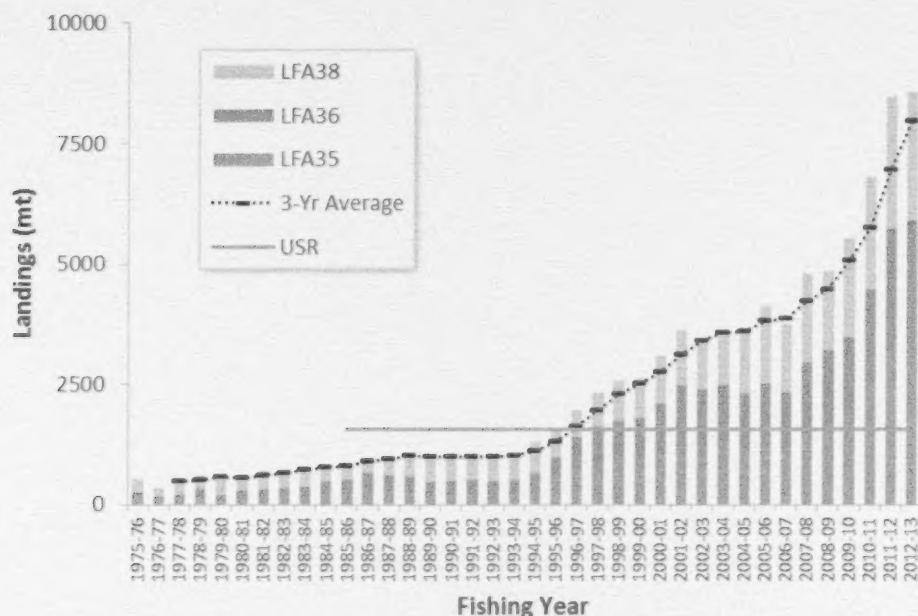


Figure 2. Lobster landings by fishing year from the commercial fishery in LFAs 35-38 from 1975 to 2012. Fishing year encompasses the fall through the early summer of the following year. The red horizontal line is the landing proposed Upper Stock Reference for the LFAs 35-38 (proposed at 1,575 metric tons for the LFAs 35-38 as a whole). The black dashes with dotted line are the 3-year moving averages for LFAs 35-38 landings.

The commercial catch-per-unit-effort (CPUE, in kg/trap haul) has increased substantially since 2005-2006, and the values from the last two years (2011-12 and 2012-13) were the highest observed. The proposed USR for the abundance of legal size lobsters based on the CPUE (0.58 kg/trap haul) is defined as 50% of the median for the reference period 2005-06 to 2008-09. As with landings, the measure for assessing where the CPUE is relative to the proposed USR is the 3-year moving average of the commercial CPUE. The most recent 3-year moving average is 1.78 kg/trap haul, three times the proposed USR (Figure 3).

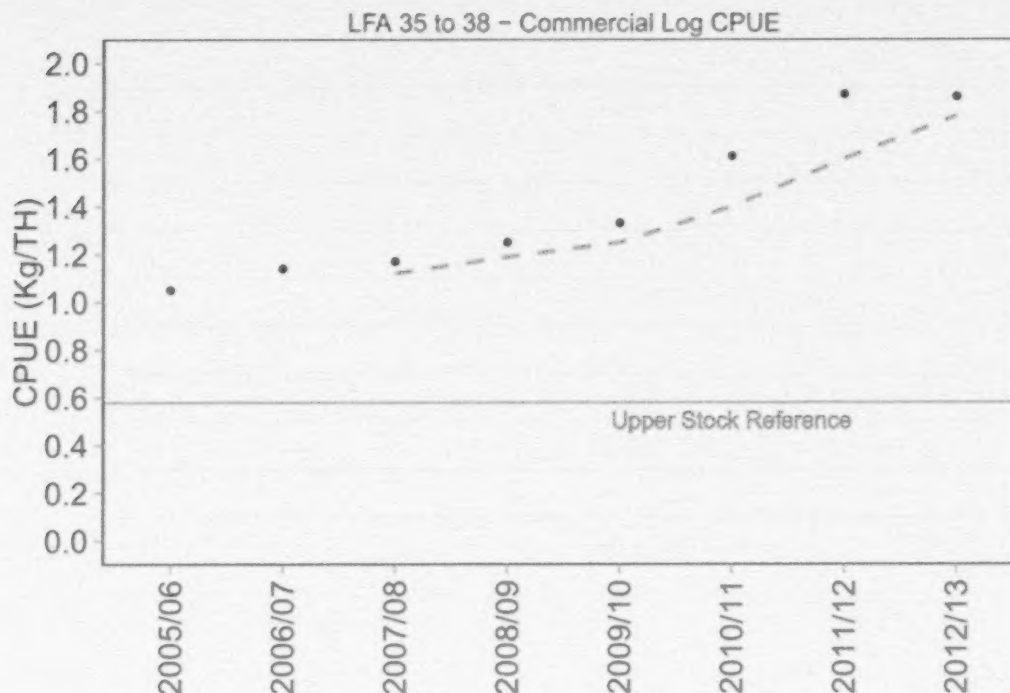


Figure 3. Trend in commercial Catch Per Unit Effort (CPUE; total weight landed/total trap hauls) per fishing year calculated from complete entries of fishermen logbooks. Proposed Upper Stock Reference is the horizontal solid blue line (proposed at 0.58 kg/trap haul). Red dashed line is the 3-year moving average.

Fishery-Independent Survey

The fishery-independent indicator proposed in the last assessment (DFO 2013) was based on lobster catch rate (number of lobsters/tow) from the summer RV survey in strata 490-495 (Figure 4). The proposed USR for lobster abundance based on this survey was 80% of the median catch rate for the period 1985-2009, which correspond to 1.9 lobsters per tow. As for the previous USRs, it was proposed that the 3-year moving average be used as the metric to assess stock status. In 2012-2013, the estimated 3-year moving average was 47.5 lobsters per tow, almost 25 times greater than the proposed USR (Figure 5).

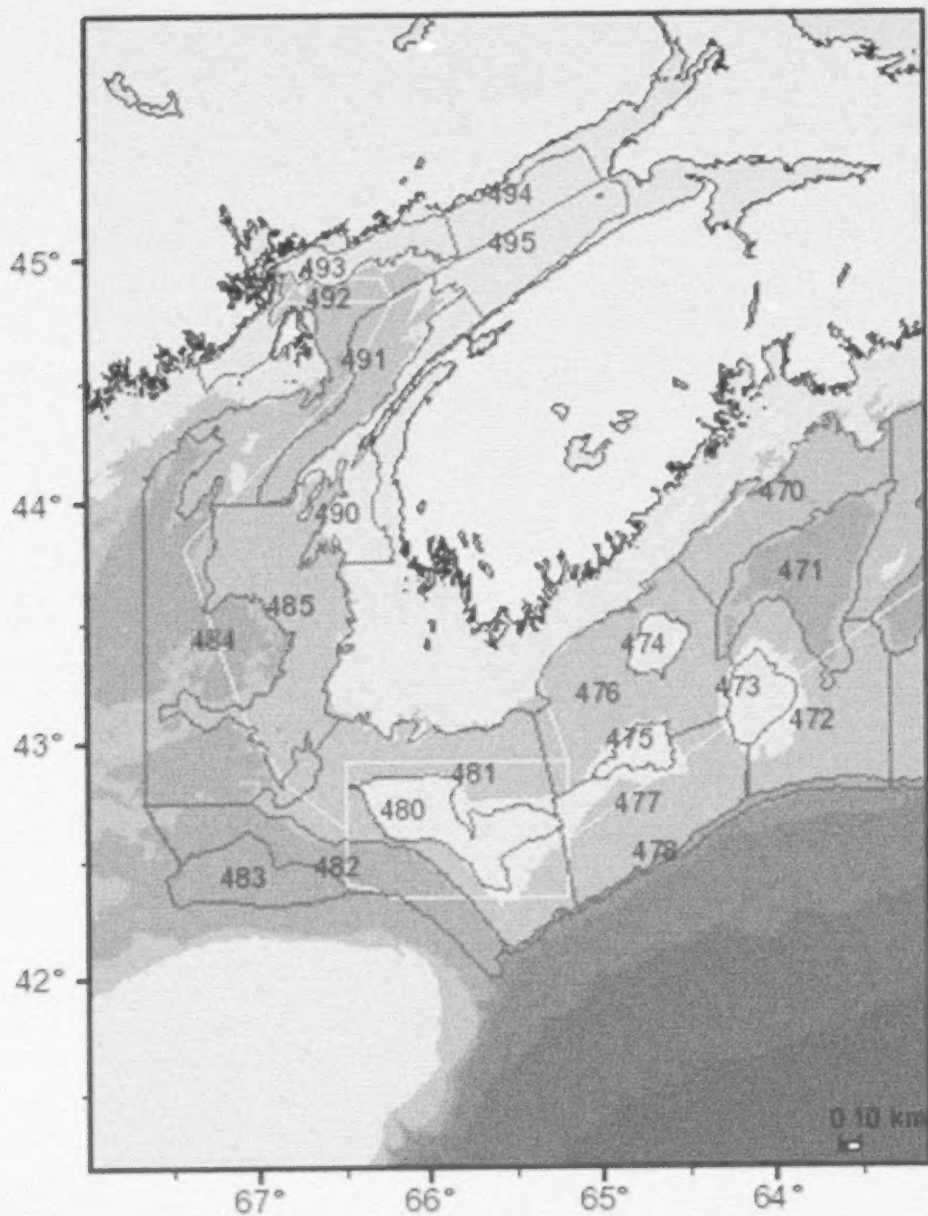


Figure 4. Summer RV survey strata in Northwest Atlantic Fisheries Organization Division 4X. Data compiled to assess lobster stock status in LFAs 35-38 are from strata 490 to 495 inclusively (n=6).

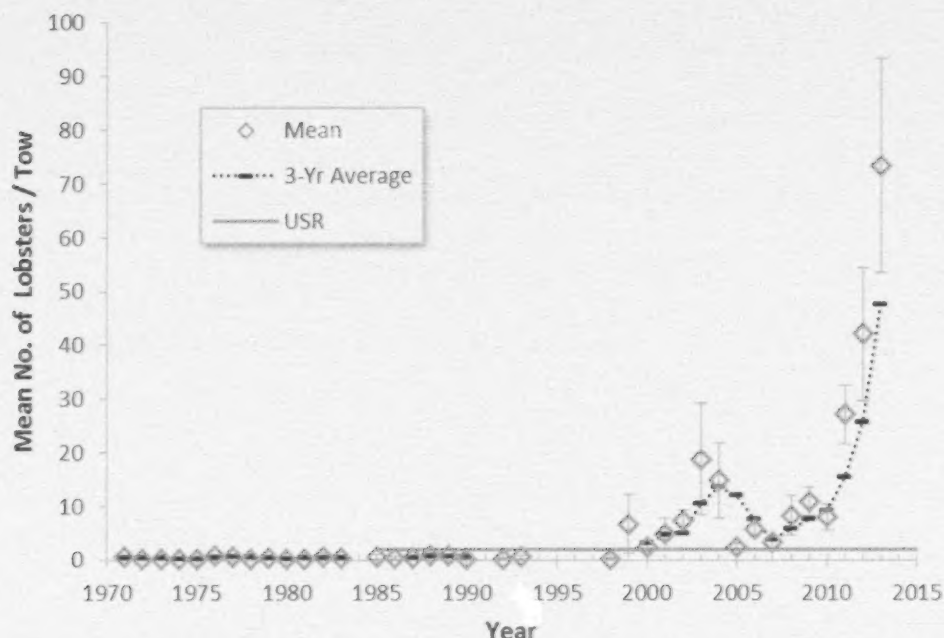


Figure 5. Stratified mean number of lobsters per tow (\pm standard error) in LFAs 35-38 from summer RV survey (Strata 490-495) calculated by averaging the mean catch rates of the 6 strata covering the Bay of Fundy. Black dashes with dotted line are the 3-year moving averages. Red solid line is the proposed Upper Stock Reference (USR) set at 1.9 lobsters per tow. NB: Years with no symbols (e.g. 1994-1997) had no lobster counts available; lobster total weights were normally recorded but lobster counts were not estimated from those weights in this assessment update.

Conclusions

The lobster stock in LFAs 35-38 at the end of the 2012-13 fishing year was in the healthy zone based on 3 abundance indicators (landings, commercial catch rate and summer RV survey catch rate). The 3-year running averages of these indicators were well above the proposed USRs.

Each of the abundance indicators have strengths and weaknesses that were outlined in the previous assessment. Given that all three are providing similar signals, there is confidence that overall abundance remains high relative to the 1994-2009 period. However, because size-at-50%-onset-maturity in the Bay of Fundy occurs at a large size (> 90 mm CL) while MLS is at 82.5 mm CL, the three primary indicators provided herein monitor a large segment of the population that are immature lobsters. Therefore, abundance trends presented here are not necessarily reflecting the broodstock trend (see Gaudette et al 2014) and are likely influenced by recruitment regimes. Monitoring broodstock abundance as a primary indicator would increase our ability to assess long-term risk of recruitment overfishing.

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Sources of Information

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